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Charitable Contributions in a Voluntary Compliance Income Tax System: Itemized Deductions versus Matching Subsidies

Alex Turk and Maryamm Muzikir, Internal Revenue Service;
Marsha Blumenthal, University of St. Thomas; and
Laura Kalambokidis, University of Minnesota

The U.S. income tax system subsidizes contributions to charities by allowing individual taxpayers to itemize and deduct contributions from taxable income. In effect, taxpayers can receive a rebate from the Government based on the contributions they make to charitable organizations. There are normative reasons for subsidizing contributions. This paper explores how, rather than why, the U.S. Tax Code subsidizes contributions.

The current U.S. tax system relies on voluntary reporting of individual taxpayers' contributions to charitable organizations. For many taxpayers, the charitable contributions are the only items on the return that are not subject to information reporting. Thus, there is potential for misreporting (both overstating and understating) the actual amounts of contributions. The ability of tax administrators to discourage misreporting is limited by two realities. First, while misreporting in the aggregate may be substantial, the average misstatement is fairly small. Second, current rules regarding the deductibility of charitable contributions already impose some burden on individual taxpayers, and ramping up documentation requirements might actually discourage bona fide contributions. One alternative way to subsidize charitable contributions through the Tax Code would be to adopt a matching system. In such a system, the contributions of individual taxpayers would be matched (at some rate between 0 percent and 100 percent) by the Government. For example, if the matching rate were 50 percent, a $10 contribution from an individual would be matched by a $5 Government subsidy. Under a matching regime, the responsibility for reporting could be placed on either the donor or the recipient. If the responsibility for reporting contributions were moved from individual donors to the recipient organizations, the compliance burden faced by individual taxpayers would decline, along with their opportunities to misreport. On the other hand, the annual compliance burden of tax-exempt organizations would increase, as Form 990 would require additional information and documentation.

Previous laboratory economic experiments (most notably those of Eckel and Grossman) have shown that total contributions to charities are

higher in a matching system, relative to one with tax-deductible contributions, holding the price per dollar contributed constant. This contradicts the predictions of simple economic models that, all else equal, taxpayers would simply reduce their contributions by the amounts of the matching subsidy leaving unchanged total proceeds going to the charity. In this experimental literature, participants have not been allowed to misreport their contributions. Once detection of noncompliance is imperfect, the effective subsidy rate becomes endogenous. In cases where the noncompliance is not detected, the effective subsidy rate can be greater than 100 percent.

This paper explores the tax policy and tax administration implications of itemizing deductions versus matching subsidies of charitable contributions. The comparison is in the context of a joint product public goods model in which individuals receive utility from total contributions to the public good and from a private good that is based on the amount of the individual's charitable contribution. The paper proposes an experimental design to test the impact of matching rather than rebating contributions in a system with voluntary reporting of individual contributions. The design extends the previous literature in several directions. Previous experimental designs have explored voluntary compliance and charitable giving, but never in the same experiment. Our design will allow for misreporting and random auditing of contributions, with overstatements subject to a penalty.

Tax Policy Implications of Itemized Deduction versus Matching Subsidies

Subsidizing charitable contribution via an itemized deduction creates differing subsidy rates (and hence prices of giving) based on the individual's marginal tax rate. The marginal tax rate, in part, determines the subsidy or price of donating to charitable organizations for taxpayers who report contributions as an itemized deduction. In a progressive tax system, those with higher incomes will receive a higher subsidy rate for charitable contributions. In addition, those who do not itemize receive no subsidy. This further creates a differing subsidy rate. For U.S. taxpayers, the decisions to itemize deductions versus taking the standard deduction are highly correlated with income and home ownership.

The differing subsidy rates for charitable contributions could be the desired result of the U.S. tax policy. It is more likely that it is an artifact of how the subsidy is administered. Charitable contributions could be subsidized at a uniform rate using a credit for or a match of contributions at some rate. However, those who do not itemize would need to report their contributions to receive the credit. Some have proposed extending the deduction

for charitable contributions to those who take the standard deduction. This would create additional burden for those taxpayers. A match scheme where the charitable organization reports the contributions could be used to equalize the subsidy rate and could potentially reduce the burden.

Tax Administration Implications of Itemized Deductions versus Matching Subsidies

The work by Eckel and Grossman, among others, has motivated the interest in the subsidy method for charitable contributions and its impact on contributions to charitable organizations. There are also many tax administration issues around the subsidy framework. The primary issues are compliance and burden.

Data from IRS's National Research Program for Tax Year 2001 are reported in Table 1 and Table 2. It seems clear that many taxpayers inaccurately report their charitable contributions. Of the roughly 43.6 million taxpayers who itemized their deductions, almost 37 million report cash contributions, and over 22 million taxpayers report noncash donations. Almost 46 percent of taxpayers who reported cash contributions and 37 percent of those who report noncash donations made errors. The aggregate amount of misreporting is fairly large. The net overstatement of cash contributions is around 13.6 billion dollars. The net misreported amount for noncash is around 3.8 billion dollars of overstated deductions.

Table 1. Frequency of Charitable Contributions Errors for Tax Year 2001 Using Raw NRP Data: All Returns[a]

	Returns that reported (thousands)	Returns that should have reported (thousands)	Returns with errors[b] (thousands)	Errors as a percentage of returns that should have reported	Errors as a percentage of returns that reported
Cash contributions	36,950	32,976	16,804	51%	45%
Noncash contributions	22,296	18,141	8,159	45%	37%
Carryover contributions from prior year	366	263	131	50%	36%

[a] Includes all returns where the deductions were itemized on Schedule A, as well as those returns where the standard deduction was originally claimed but the deductions should have been itemized.

[b] Returns with Errors exclude returns that had overstatements and understatements that exactly offset each other resulting in no net error.

Source: National Research Program study of Tax Year 2001 individual income tax reporting compliance, tabulations of the raw data projected to the U.S. population, March 2007.

While there they may be inaccuracies on a large portion of the returns, the average amount of error on each return is fairly small. For those taxpayers who made errors in reporting cash contributions, the average error was $811. For all returns that report noncash contributions, the average error was $369. The fact that errors are widespread but relatively small makes enforcement mechanisms unattractive alternatives for correcting the noncompliance. Other mechanisms that increase the visibility of the contributions are likely to be more efficient and less burdensome methods of ensuring compliance.

Table 2. Magnitude of Charitable Contributions Errors for Tax Year 2001 Using Raw NRP Data: All Returns[a]

	Magnitude of errors					
	Amount reported ($M)	Amount should have reported ($M)	Net misreported amount ($M)[b]	Average error ($) - returns with errors	Average error($) - returns that report	Net misreporting percentage[c]
Cash contributions	99,127	85,284	13,631	811	369	16%
Noncash contributions	29,015	25,725	3,786	464	170	15%
Carryover contributions from prior year	10,230	9,323	888	6,791	2,427	9%

[a] Includes all returns where the deductions were itemized on Schedule A, as well as those returns where the standard deduction was originally claimed but the deductions should have been itemized.

[b] Net Misreported Amount excludes amounts that are reported correctly on the wrong line.

[c] Net Misreported Amount divided by the sum of the absolute values of the amounts that should have been reported.

Source: National Research Program study of Tax Year 2001 individual income tax reporting compliance, tabulations of the raw data projected to the U.S. population, March 2007.

Another factor to consider is the burden placed on individual taxpayers. Expanding information reporting on charitable contributions would make the transaction more visible and should improve compliance. However, these requirements would undoubtedly increase the total burden placed on individuals and charitable organizations.

There are considerable documentation requirements for gifts of cash and other items, and the requirements are being ramped up. The IRS Individual Burden Model was used to simulate the burden under the scenario where charitable contributions are eliminated as an itemized deduction on Schedule A.[1] The simulation analysis was done for Tax Year 2005 filings. The difference between the burden under this scenario and the baseline scenario can be interpreted as the burden associated with the charitable contribution deductions. Burden is classified and measured as both the time

[1] This analysis was provided by the IRS Office of Research, Analysis, and Statistics.

burden (hours) and monetary burden (U.S. dollars.) The time burden and the monetary burden are mutually exclusive, and the total burden is the union of these two measures. The results of the simulation are reported in Table 3. The estimated average time burden for charitable contributions is between 2 and 2.8 hours per return with Schedule A. The aggregate time burden is between 81.0 and 113.6 million hours. In addition, the dollar burden is between $52.8 and $53.9 per return with Schedule A. The aggregate dollar burden is between 2.15 and 2.20 billion dollars.

Table 3. Estimated Burden of Charitable Contributions Reporting

Burden measure	Average burden	Total burden
Time burden	2 to 2.8 hours	81 to 113.6 million hours
Monetary burden	$53 to $54	2.15 to 2.2 billion dollars

Source: Individual Burden Model, IRS Research, Analysis, and Statistics.

Analysis of the 2005 tax filings suggests that, for a substantial number of taxpayers, charitable contributions are the only itemized deduction that is likely not provided to them on an information document or yearend summary.[2] Over 60 percent of the taxpayers who itemize deductions report only Interest Paid and Taxes Paid in addition to charitable contributions. The vast majority of this information is already subject to information reports. The error rates, in terms of magnitude, for the interest and tax items on Schedule A are relatively small.[3]

Previous Literature

The Theory of Charitable Giving

The challenge in constructing a theory of charitable giving lies in addressing a well-known inconsistency: while a standard public good model with charitable donations predicts both substantial free-riding and suboptimal giving, the empirical evidence tells us that donations to charities are widespread and often very generous. Becker (1974) observes that the standard public good models incorporate charitable giving by supposing that charitable giving is simply another good entering the representative philanthropist's utility function: $U_i=U_i(x_i,g_i)$, where x_i is his or her consumption of a private good and g_i is his or her consumption of charitable giving (i.e., his or her contri-

[2] Analysis of Tax Year 2005 Schedule A data in the IRS Compliance Data Warehouse, March 2007.

[3] Unpublished analysis of the raw TY2001 NRP reporting compliance study of individual income tax returns provided by IRS Research, Analysis, and Statistics, March 2007.

bution to the public good). Becker proposes instead a utility function that takes as arguments the individual's own consumption of a private good (x_i), along with the total contributions from everyone (including this individual) to the public good (G): $U_i=U_i(x_i,G)$. In this way, an individual's altruism, or concern for the welfare of others, enters his or her utility function in concert with the giving of others. While Becker's utility-maximizing individuals contribute more as their incomes increase (and less as others' incomes rise), the model still predicts substantial free-riding and inefficient provision (Sugden, 1982,1984; Cornes and Sandler, 1984; Steinberg, 1987). As an alternative, Sugden proposes that individual giving behavior is governed by a moral principle, reciprocity. The principle of reciprocity is that an individual will contribute to a public good when others do.[4] For example, suppose everyone else is contributing "g." Given this, an individual determines how much he or she would most prefer everyone were contributing, say "g*." If g* is at least as large as g, then, by reciprocity, the individual is obliged to contribute at least g. An important result in Sugden's model is a reduction in free-riding, as an individual responds to the increased contributions of others by raising his or her own giving.

Cornes and Sandler (1984) take a different approach. In their model, utility-maximizing individuals purchase two marketed goods. One (c) yields only private benefits, while the second (q) is capable of jointly producing both public (Z) and private characteristics (x). Utility is a function of the purely private good and both the public and private characteristics produced by q: $U_i=U_i(c,x,Z)$. Here, Cornes and Sandler also demonstrate reduced free-riding, as an increase in everyone else's purchases of q *may* induce an individual to purchase more of it as well. Furthermore, they show that, in contrast to the predictions of standard models, if the two jointly-produced goods are complementary, the suboptimality of Nash equilibrium public good provision need not worsen with the size of the community.[5]

Free-riding in the standard public good model also arises when a public good is supported both by private donations and the Government. The neutrality hypothesis holds that Government provision of a public good, financed by lump-sum taxes, will crowd out private giving, dollar for dollar. As one salient example, Roberts (1984) observes that public transfers to the poor during the Great Depression reduced private charity, causing a movement among private agencies away from relieving poverty and toward other activities. Because of the considerable empirical evidence at odds with the neutrality hypothesis, theorists have sought more consistent models.

[4] Sugden's reciprocity is a weaker version of the Kantian notion of unconditional commitment.

[5] Hicksian complementarity: Hold x constant while Z increases and decrease c to keep utility fixed. If the willingness-to-pay for x increases, then x and Z are "q-complements."

In Steinberg's (1987) model, a public good is supported by private donations and two levels of Government (Federal and local). Individual utility depends on consumption of a private good, one's own donations to a public good, and the amount of the public good otherwise available. Crowding out, under plausible circumstances, is shown to be incomplete. Andreoni (1989,1990) supposes that individuals have two reasons for charitable giving, altruism and egoism. Altruism is simply a desire for more of a public good. A purely altruistic individual will be indifferent between supporting the public good by paying a tax (Government donation) or by making a private donation, holding his or her private consumption and the giving of others constant. In this case, neutrality holds. Egoism, on the other hand, is a desire to contribute in order to derive some private benefit, perhaps a "warm glow." A purely egoistic individual will strictly prefer making a private donation over paying a tax that funds Governmental giving, so that there will be no crowding out. Where both reasons motivate behavior, Andreoni posits "impure altruism." In that case, direct Government grants financed by lump sum taxes will only partially crowd out private donations, and Government subsidies of charitable contributions can increase giving. For example, in the U.S. Tax Code, the charitable donations of itemizing taxpayers are subsidized by the provision of a tax deduction. This deduction effectively rebates a fraction of each contributed dollar back to the taxpayer. To the extent that this subsidy generates more giving than would otherwise take place, one important insight of Andreoni's model is that this happens *not* (or at least not entirely) because of the price elasticity of giving, but rather because of the warm glow of giving—impure altruism.[6]

Laboratory Experiments

Recently, researchers have begun to consider charitable giving from the demand side of the charity market, that is, from the perspective of fundraisers. Perhaps a fundraiser's most critical objective is to select those procedures or practices that will produce the largest revenue stream for a charity. While fundraising professionals often employ a set of best practices gleaned from their collective, anecdotal experience, scholars have now begun to subject them to theoretical and empirical validation. One commonly-used practice is to inform potential donors that any contribution they make will be matched by another donor.[7] Augmenting the donations of individuals

[6] There is a considerable price and income elasticity literature. See Clotfelter (1980), Randolph (1995), Steinberg (1990), Peloza and Steel (2005), and Auten et al. (2002). While the magnitudes vary, there is both empirical and experimental evidence that giving rises as its price decreases.

[7] For example, contributions may be matched by one's employer.

in this way in effect subsidizes their giving, though in a different manner than does the implicit rebate of the charitable deduction in the U.S. income tax.[8] In a widely-cited laboratory experiment, Eckel and Grossman (2003) compare the donations received by charities when donations are subsidized by a match versus a rebate. They reason that a rebate subsidy (with rebate rate, r) in which an individual donating $X to a charity receives a rebate of $rX is theoretically comparable to a matching subsidy in which the match rate, m, is set so that the match-inclusive amount received by the charity is $X.[9] Theoretically, comparable rebate and match subsidies will confront the donor with the same effective price per contributed dollar. Ceteris paribus, a donor would then be indifferent between the two subsidy mechanisms and, in moving between them, would adjust his or her contributions so that the charity receives the same amount.[10] Using a within-subjects design (each subject choosing under both match and rebate subsidies), they find, however, that the net contributions received by a charity are significantly larger with the match subsidy. One suggested explanation for the result is the operation of a framing effect affecting how subjects perceive the subsidies. A rebate subsidy may be perceived as a reward from a third party. Giving in this case is an isolated, individual endeavor. In contrast, a match subsidy may be perceived as a cooperative endeavor, with the third party working in concert with the donor to provide the public good. Giving in this case is more social, assuring the individual that at least one other person is also doing his or her share. If subjects prefer the cooperative frame, so that price is not the only determining factor, then we might well expect charities to receive more in the presence of a matching subsidy. A second plausible explanation for the result is that the subjects either did not fully attend to or were unable to fully understand the difference between the subsidies, perhaps, for example, interpreting a 25-percent rebate as a less generous subsidy than a 33 1/3-percent match. To eliminate the burden on subjects of comparing the two subsidies, Eckel and Grossman (2006a) repeated their laboratory experiment

[8] A hybrid rebate-matching subsidy has been a feature of the U.K. income tax system since the 1920s (Morgan, 2000). Under current Gift Aid rules, a charity receiving a donation of X pounds may claim an additional amount from Inland Revenue, equal to X[t/(1-t)] pounds, where t is the base tax rate, .22 in 2007. Taxpayers with higher tax rates are personally eligible for a rebate of the additional tax paid on the X pound gift. Donations from taxpayers with lower tax rates are eligible for Gift Aid provided that the taxes paid by the donors are at least as large as the corresponding gift aid amounts.

[9] If m is the match rate and r is the rebate rate, then the two subsidies will be "theoretically comparable" if m= r/(1-r). For example, a 25-percent rebate rate is theoretically comparable to a 33 1/3-percent match rate. Under a 25-percent rebate, a $1 gift has a price of $0.75 and transfers $1 to a charity. Under a 33 1/3-percent match, a charity will receive $1 when a donor contributes $0.75, matched by $0.25.

[10] That is, a donor will contribute a smaller gross amount in a matched subsidy than in a comparable rebated subsidy, while net contributions would be the same. For a rebate subsidy, net contribution = gross contribution; for a match subsidy, net contribution = gross contribution + match.

using a between-subjects design, assigning subjects randomly to either a match or a rebate regime. Freed of the need to recognize how the two subsidies differ, net contributions continue to be higher when matched than when rebated.

Building on Eckel and Grossman's initial paper, Davis, Millner, and Reilly (2005) seek to explore the experimental phenomenon further. First, they run a replication of the original experiment, with the result that charity receipts are again higher under matching subsidies than under theoretically comparable rebate subsidies. However, they cast doubt on the framing hypothesis by pointing out that, in both subsidies, subjects tended to donate the same fraction of their endowments to charities, either simply or stochastically (constant contribution pass rate).[11] That is, rather than paying attention to adjusting their contributions across subsidies, subjects just gave the same proportion of their endowments in both cases. Their hypothesis might be expected to hold if the calculation necessary to adjust contributions were difficult to understand, if subjects did not care much about making charitable contributions, or if subjects' utilities were otherwise enhanced by inattention to this task.

Next, in order to remove any potential "cooperation" framing effect, Davis, Millner, and Reilly (2005) conduct a similar experiment, but using an investment context: subjects decide how much of their endowments to hold as cash and how much to pass to an investment account. Deposits to the investment account (A) earn a quadratic return with certainty (return = 1.5 A – 0.5 A2). In a within-subject design, each subject is offered different investment subsidies and subsidy rates, along with different endowments. The result is that deposits in their investment accounts are uniformly lower under a rebate subsidy than under a theoretically comparable matching subsidy.[12] Finally, in order to explore the role of information, Davis, Millner, and Reilly construct a third experiment. Returning to the charitable donation context, subjects are presented with only two allocation scenarios at a time, one of which offers a rebate and the other a theoretically comparable match.[13] To ensure that subjects are completely cognizant about each scenario, the outcomes of each possible allocation decision are presented in a table. They find that mean charity receipts are still significantly lower

[11] By stochastic constant contribution pass rate, they mean that the distribution of match pass rates that exceed rebate pass rates is symmetric with the distribution of match pass rates that are lower than rebate pass rates.

[12] In a related experiment, Davis and Millner (2005) presented a more familiar retail context in which subjects were offered opportunities to purchase subsidized chocolate bars. Two findings are interesting. First, at any price, net purchase quantities are higher for a matching sales format than for a comparable rebate sales format. Second, while constant contribution behavior appears to explain a good deal of this behavior, there is also evidence of an aversion to rebates.

[13] The earlier experimental design presented as many as 10 allocation problems at a time.

for the rebate subsidy. In concluding, these authors point out that if donors adopt a constant contribution strategy, then their gross charitable contributions will be the same regardless of both the subsidy rates and the type of subsidy regime. In that case, they continue, a tax authority should avoid offering a rebate subsidy, since a rebate merely replaces a private donation with the Government's tax expenditure.

> "Matching subsidies, while less harmful, are still at best innocuous. Since matching rates do not affect private contributions, the subsidizing agency can efficiently achieve a target contribution level for a charity by simply topping up any unsubsidized privately collected sums. Selecting ex ante a matching subsidy level may cause the agency to either miss its target, or to pay more than necessary to achieve the target."[14]

A clear implication of this reasoning is that, if the authority wishes to offer a matching subsidy that is theoretically comparable to a given rebate subsidy, it cannot determine the appropriate matching subsidy rate without knowing how much the donor will contribute to the match. The theoretically comparable match subsidy rate is endogenous.

Field Experiments

Extending their work to the field, Eckel and Grossman (2006) use one charitable organization's regular mailed fundraising solicitations to study the responses of donors when they are offered either a rebate of or a match for their contributions.[15] Their univariate results indicate that own donations under a match subsidy (excluding the match amounts) are significantly higher than donations under the equivalent rebate subsidy (before rebate). Regressions that allow them to control for certain socioeconomic characteristics show no significant differences in own giving by subsidy type; this implies that, once the matching contributions are included, the revenue received by the charity under a matching subsidy exceeds the revenue under an equivalent rebate subsidy. They also uncover some evidence that some givers are averse to rebate subsidies: only 39 percent of those offered a rebate accepted it, while 73 percent of those offered a match accepted it. Finally, while giving in this experiment was sensitive to the presence of a subsidy, it was not significantly affected by the level of the subsidy.

[14] Davis, Millner, and Reilly (2005), page 103. While this is true for the assumption of constant contributions, it is also more generally true whenever donors do not completely adjust their giving across subsidy regimes so as to keep net contributions constant.

[15] Of course, because the experiment took place in the United States, subjects who itemized deductions on their income tax returns would receive an additional rebate subsidy.

The results of a similar mailed solicitation field experiment are reported by Karlan and List (2007). In this experiment, prior donors of a nonprofit organization are randomly assigned to treatment and control groups. The treatments consist of announcements of match offers, varied along several dimensions, including the match rate (price of giving). Because this experiment was conducted in the United States, a rebate subsidy was available to all itemizing subjects, in the control and treatment groups. Karlan and List's prediction about the direction of the price effect is ambiguous. Subjects might respond to a higher match rate by giving more (e.g., due to the typical influence of price on quantity demanded or because a higher match rate signals that the charity is more socially important or in greater need of donations now) or by giving less (e.g., if they see the announcement as a marketing trick or because the existence of a match reduces the marginal utility of their donations). The results show that the announcement of a matching gift matters, since both the revenue per solicitation and the probability that an individual will donate are significantly greater in the treatment groups. Interestingly, consistent with Eckel and Grossman's field experiment findings, larger match ratios relative to smaller match ratios have no additional impact.

Often, a charitable organization solicits contributors at regular intervals (annual fundraising drives, for example). In a randomized field experiment among Swiss university students, Meier (2007) tests whether a temporary matching subsidy influences donations in the long run, as well as short term. As continuing students paid their tuition for the upcoming term, they were asked for voluntary contributions to two funds, CHF 7.0 to a fund offering low-interest loans to financially-strapped students and a CHF 5.0 to a fund supporting foreign students. Students in the treatment groups were told that if they donated to both funds, a matching contribution (with either a 25-percent or a 50-percent match rate) would be split equally between the funds. Students in the control group were solicited without this match. In six ensuing terms, the university repeated its request for contributions, but without the match offer treatment. The results indicate that donations to both funds rose immediately after the match offer. However, in the next term (and to a lesser extent in the ensuing terms), the number of students in the treatment groups contributing to both funds decreased significantly, relative to the controls. Overall, the impact of the matching mechanism on donations was negative.

In the U.K., where the tax authority has long offered to match charitable contributions, at rates approaching 30 percent, a 2005-06 survey of donors showed that about 34 percent made use of Gift Aid in an average month. The likelihood of giving in this tax-effective way was stronger

among large donors: 57 percent of donors giving 100 pounds or more per month used Gift Aid, in contrast to 39 percent of those giving between 5 and 25 pounds and 17 percent of those giving less than 5 pounds (NCVO-CAF, 2006).

Theoretical Model

In this section, we explore optimal subsidized contribution behavior in the context of three cases. In the first, an individual's utility depends only on his or her consumption of a private good and of a public good toward which he or she may contribute. Contributions are subsidized by either a rebate or a match. In the second case, contributions produce a private benefit (e.g., a "warm glow"), as well as the public good, and, again, contributions are subsidized either by a rebate or a match. Finally, we alter the second case by introducing required reporting of contributions, accompanied by random Government audits and penalties for overstatements.

Case 1

Consider a society with n identical individuals. Each has an endowment (I), using it to purchase units of a private good (Y) and to make contributions (x_i) to a public good (g). The government can subsidize the public good by offering either a rebate, at rate *t*, or a matching contribution, at rate *m*. The level of the public good is the result of this individual's contribution (x_i) and of the contributions of everyone else (X_{-i}). Each individual allocates his or her endowment so as to maximize an additively separable utility function, subject to a budget constraint:[16]

Rebate

Max $U_i = u(Y) + g(X_{-i} + x_i)$ subject to
x_i

$$Y = I - x_i + tx_i$$

The first-order condition is:

$$\frac{dU_i}{dx_i} = -u'\left(I - x_i + tx_i\right)\left(1 - t\right) + g'\left(X_{-i} + x_i\right) = 0$$

[16] Assume that u, c, and g are all twice-differentiable, increasing, and concave.

The utility-maximizing individual continues to donate until the marginal utility of the foregone private good is equal to the marginal utility of the public good.

Match

Max U_i=u(Y) + g[X_{-I} + (1+m)x_i] subject to
x_i

$$Y = I - x_i$$

The first-order condition is:

$$\frac{dU}{dx_i} = -u'(I - x_i) + g'[X_{-i} + (1+m)x_i](1+m) = 0$$

Toward comparing these similar first-order conditions, suppose that the government chooses t and m so that a dollar contribution via rebate has the same price as a dollar contribution via a match, i.e., $(1+m) = \frac{1}{(1-t)}$. Also suppose that the individual, sensing the equivalence of the two subsidies, adjusts his or her contributions so that the charity receives the same amount either way, i.e., x_{imatch}=(1-t)$x_{irebate}$. It is easy to show then that the two first-order conditions are identical. For the match first-order condition, we have:

$$-u'[I - (1-t)x_{irebate}] + g'\left[X_{-i} + \frac{1}{1-t}(1-t)x_{irebate}\right]\left(\frac{1}{1-t}\right) = 0$$

$$-u'[I - x_{irebate} + tx_{irebate}](1-t) + g'[X_{-i} + x_{irebate}] = 0$$

It is this "equivalence" that Eckel and Grossman's experiments suggest does not hold.

Case 2

Alternatively, suppose that an individual's contribution jointly produces the public good (g) and a private benefit (c, a "warm glow"). The objective function for an individual, assuming an additively separable utility function, is:

Max U_i = u(Y) + c(x_i) + g(X_{-i} + x_i)
x_i

Rebate

The budget constraint is $Y = I - x_i + tx_i$. The first-order condition is:

$$(1) \qquad \frac{dU_i}{dx_i} = u'\left(I - x_i + tx_i\right)(t-1) + c'(x_i) + g'\left[X_{-i} + x_i\right] = 0$$

Match

The budget constraint here is $Y = I - x_i$, while the public good becomes $g[X_{-i} + (1+m)x_i]$ and the warm glow depends only on the individual's contribution.

The first-order condition is:

$$(2) \qquad \frac{dU_i}{dx_i} = -u'\left(I - x_i\right) + c'(x_i) + g'\left[X_{-i} + (1+m)x_i\right](1+m) = 0$$

Suppose that the government sets the subsidy rates equivalently, with $(1+m) = \frac{1}{1-t}$ and that the individual behaves equivalently, setting $x_{imatch} = (1\text{-}t)x_{irebate}$. Substituting in (2) yields:

$$(2') \qquad (t-1)u'\left(I - x_{irebate} + tx_{irebate}\right) + (1-t)c'\left[(1-t)x_{irebate}\right] + g'\left[X_{-i} + x_{irebate}\right] = 0$$

Notice that, comparing (1) and (2'), the middle terms differ, with a smaller warm glow produced by an equivalent matched contribution. That is, an individual contributing equivalently in this setting would experience more utility with a rebate subsidy than with a matching subsidy. In order to generate indifference, contributions in a matching subsidy would need to be "more than equivalent," relative to a rebate subsidy.

Case 3

Next, we introduce a Government requirement for individuals to accurately report their contributions. The Government monitors compliance by auditing a fraction, ρ, of the individuals who report contributions. If the individual has overstated his or her contribution, the audit detects the fudged amount (f), and the Government adjusts the subsidy and imposes a penalty, rf, on the individual.

Rebate

Depending on whether the individual is audited, there are two budget constraints:

$$Y = I - x_i + tx_i + tf = A, \text{ if not audited and}$$
$$Y = I - x_i + tx_i - rf = B, \text{ if audited.}$$

The choice problem is therefore:

$$\underset{x_i, f}{\text{Max}}\ U_i = (1-\rho)\{u(A) + c(x_i) + g(X_{-i} + x_i)\} + \rho\{u(B) + c(x_i) + g(X_{-i} + x_i)\}$$

The two first-order conditions are:

$$\frac{\partial U}{\partial x_i} = (1-\rho)\{-u'(A)(1-t) + c'(x_i) + g'(X_{-i} + x_i)\} + \rho\{-u'(B)(1-t) + c'(x_i) + g'(X_{-i} + x_i)\} = 0 \tag{3}$$

$$c'(x_i) + g'(X_{-i} + x_i) = (1-\rho)u'(A)(1-t) + \rho u'(B)(1-t)$$

The sum of the marginal utilities of a small addition to warm glow and to the public good must be equal to the expected marginal utility of the (smaller) foregone Y.

$$\frac{\partial U}{\partial f} = (1-\rho)[u'_i(A)t] - \rho[u'_i(B)]r = 0 \tag{4}$$

$$\frac{1-\rho}{\rho} = \frac{ru'_i(B)}{tu'_i(A)}$$

The optimal f is the one such that the ratio of (1-ρ) and ρ (i.e., the odds of not being audited) is equal to the ratio of the penalty rate (r) and the rebate rate (t) multiplied by the ratio of the marginal utilities of the foregone Y in each state.

Match

The Government subsidizes contributions to charities by matching them, at rate m. Donors are required to report their contributions and are audited

at rate, ρ. Individuals who overstate their donations are penalized on the fudged amount, at rate, r. An unaudited individual faces $Y = I - x_i$ and $g[X_{-i} + (1+m)(x_i + f_i)]$, while an audited individual faces $Y = I - x_i - rf$ and $g[X_{-i} + (1+m)x_i]$.

The individual's objective then is:

$$Max\, U_i = (1-\rho)\left\{U\left(I - x_i\right) + c\left(x_i\right) + g\left[X_{-i} + (1+m)\left(x_i + f_i\right)\right]\right\} +$$

$$x_i, f_i \qquad \rho\left\{U\left(I - x_i - rf_i\right) + c\left(x_i\right) + g\left[X_{-i} + (1+m)x_i\right]\right\}$$

The first-order conditions are:

$$(5)\quad \frac{\partial U_i}{\partial x_i} = (1-\rho)\left\{-u'\left(I - x_i\right) + c'\left(x_i\right) + g'\left[X_{-i} + (1+m)\left(x_i + f_i\right)\right](1+m)\right\} +$$

$$\rho\left\{-u'\left(I - x_i - rf\right) + c'\left(x_i\right) + g'\left[X_{-i} + (1+m)x_i\right](1+m)\right\} = 0.$$

$$(6)\quad \frac{\partial U_i}{\partial f_i} = (1-\rho)\left\{g'\left[X_{-i} + (1+m)\left(x_i + f_i\right)\right](1+m)\right\} +$$

$$\rho\left\{-u'\left(I - x_i - rf_i\right)r\right\} = 0$$

$$\frac{1-\rho}{\rho} = \frac{ru'\left(I - x_i - rf\right)}{(1+m)\,g\left[X_{-i} + (1+m)\left(x_i + f_i\right)\right]}$$

To explore the consequences of the two subsidies being equivalent, again set $(1+m) = \frac{1}{1-t}$ and assume $x_{imatch} = (1-t)\,x_{irebate}$. For notational ease, let $x_{irebate} = x_{iR}$. In that case, (5) becomes (5') and (6) becomes (6'):

$$(5')\quad (1-\rho)\left\{-u'\left(I - x_{iR} + tx_{iR}\right)(1-t) + (1-t)\,c'\left(x_{iR} - tx_{iR}\right) + g'\left[X_{-i} + x_{iR} + f\right]\right\} +$$

$$\rho\left\{-u'\left(I - x_{iR} + tx_{iR} - rf\right)(1-t) + (1-t)\,c'\left(x_{iR} - tx_{iR}\right) = g'\left[X_{-i} + x_{iR}\right] = 0\right.$$

$$(6')\quad (1-\rho)\,g'\left[X_{-i} + x_{iR} + \left(\frac{1}{1-t}\right)f_i\right] - \rho\left(\frac{r}{1-t}\right)u'\left(I - x_{iR} + tx_{iR} - rf\right) = 0$$

Note that, for the optimal choice of x_i, the first-order conditions, (3) and (5'), are different. Similarly, the first-order conditions for the optimal choice of f_i, (4) and (6') differ. This implies that an individual who behaves equivalently in response to these equivalent subsidies will not be indifferent between

them. Utility-maximizing individuals will make nonequivalent choices of both x_i and f_i across the two subsidies.

Experimental Design

This paper proposes a laboratory experiment designed to test several of the hypotheses raised by the preceding theoretical model. The experiment consists of several stages, each including elements designed to test specific hypotheses. To allow for variation in the experiment parameters, multiple participants will engage in each activity. And to allow for learning about the consequences of their choices, each participant will complete multiple rounds of the activities. At the end of the experiment, participants receive the payoff from a single round, drawn at random.

In the first stage of the experiment, subjects participate in an activity in which they can voluntarily contribute to a public good without any subsidy. The main purpose of this stage is for participants to learn how the activities work and to establish a baseline for charitable giving. In the second stage, we will examine the difference between the contribution-matching and rebate systems for Government support of charities. The design of this stage will be very similar to the experiments conducted in earlier studies, described in our previous discussion of the literature. Two subsequent variations on the experiment will measure the price elasticity of donations and test whether the value of the subsidy rate influences donor behavior. Finally, we will introduce noncompliance in reporting charitable contributions and examine changes in donor behavior when the subsidy is based on reported, rather than actual, contributions.

While many experiments have addressed one or the other of these issues—voluntary contributions or tax compliance—combining the two issues in a single design will be unique.

Stage 1: Voluntary contributions to a public good

In this stage, participants will engage for multiple rounds in an activity in which they choose how to divide an amount of endowed income between a private and a public good. At the beginning of each round, each participant will be assigned a random amount of income, *I*, and will be instructed to divide that income between a private investment and a public good. The activity will be completed by multiple participants, allowing for variation in income. Contributions will be made anonymously so that each participant knows only his or her own contribution. At the end of each round, partici-

pants will be told their total payouts, including the value of the public good, *X*.

There are several ways to structure the charity—or public good—to which experiment participants donate. One option is to generate a nonrival, nonexcludable public good within the experiment. For example, Alm and Jacobson (2007) describe a set of experiments in which participants allocate their incomes between a private investment and a public good, which yields a return to each participant in the amount of the sum of total contributions by all participants. The private investment yields a return to the individual equal to some multiple, $\alpha \geq 1$, of the amount of income kept. Consequently, if a participant with income I_i chooses to donate $x_i=\gamma(I_i)$, where $0 \leq \gamma \leq 1$, his or her payout will be $\alpha (1-\gamma)I_i + X$, where $X=X_{-i}+x_i$ and X_{-i} is the sum of contributions by all the other participants.

Alternatively, the public good can be a real charity, either chosen by the participant from a list provided by the experimenter, as in Eckel and Grossman (2003), or by default, as in the natural field experiments described by Eckel and Grossman (2006, 2007). In both of these cases, actual contributions to the charities are made, and, at the end of a round, participants are told the size of total contributions to their charities.

While we think either approach—contributions to a real charity or a within-experiment public good—can be used to examine individuals' propensities for voluntary giving, we also want to examine the effect of a private benefit, or warm glow, from donating. This is the element c(x) that we defined earlier. We think it will be difficult to generate the private benefit when the public good is generated within the experiment and participants are unknown to one another. Therefore, we will have participants make donations to an actual charity, chosen from a list of several diverse but well-known organizations, and provide donors with some public recognition of their contributions or a letter of gratitude from the charity.

Participants will be randomly selected into two groups. One group will be told that, at the end of the experiment, those who make donations will receive the recognition or gratitude letters. To examine the influence of the private benefit on giving behavior, the second group will not receive the recognition or letter, even if they made contributions.

With the results of this stage, we will be able to estimate the income elasticity of giving as well as test these hypotheses:

(H1.1): Donors will make voluntary contributions to a public good.

(H1.2): Controlling for income, a private benefit in the form of public recognition of giving or gratitude from the recipient will increase donations.

Stage 2: Matching versus equivalent rebate

This stage will have the same structure as the first, with the addition that participants will be told that the public good will be subsidized with a match at rate m or through a rebate at rate t. The rates will be set so that the price paid by an individual for a \$1 contribution is the same in both subsidy conditions, i.e., $(1+m)=\frac{1}{1-t}$. Whether a participant faces the match or subsidy regime will be randomized so that a single participant will face both regimes multiple times throughout the experiment.

At the end of each round, participants will be told the total value of the public good, including the match, if any, and the total amount of income they retain, including the rebate, if any.

The activity will be completed by multiple participants, allowing for variation in income. However, m and t remain the same throughout this stage of the experiment.

One explanation for the observed increase in donations under a matching regime is that the way the options are explained to participants—the way they are framed—influences outcomes. For example, in the field experiment conducted in Karlan and List (2003), prospective donors were told that the opportunity to have their contributions matched would be available for a limited time, and that the match would be provided by another concerned member of the organization.[17] In our experiment, instructions will be carefully worded to limit the influence of framing on participants' choices. For example, both the match and the rebate will be available only for the activity period, and the participant will learn the size of the payoff at the same time—the end of each activity period—for both types of subsidy. In addition, participants will know that the neutral experiment administrator will provide the subsidy, rather than another donor or the Government.

With the results of this stage, we will be able to test several hypotheses about donor behavior:

(H2.1) Controlling for income, donors will make larger contributions under the matching system than under the equivalent rebate system.

(H2.2) Controlling for income, the probability of making a contribution is larger under the matching system than under the rebate system.

(H2.3) The income elasticity of contributions is larger under the subsidy system than under the rebate system.

[17] Karlan and List (2007), p. 8.

Stage 3: Varying match and rebate rates

To measure the price elasticity of giving, we will alter the experiment so that each participant is randomly selected into either the match system or the rebate system, and remains in that system for each activity. Within each group of participants, we will vary the size of m or t, respectively. With the results of this stage, we will be able to measure the price elasticity of contributions under both systems and test this hypothesis:

> (H3.1): The price elasticity of contributions is larger under a match system than under a rebate system.

Stage 4: Equal match and rebate rates

In addition to the framing problems described above, a second explanation for larger contributions under the match system is that, when m and t are set to be equivalent, with $(1+m)=\frac{1}{1-t}$, m will be greater than t. For example, a match rate of .25 has an equivalent rebate rate of .20. It is possible that participants focus on the percentage value, ignoring the structure of the subsidy (match versus rebate), and give more because the match rate appears to be more generous. To explore this, we will alter the experiment so that m and t are equal (though no longer equivalent with regard to the price of giving). The results from this stage will allow us to test this hypothesis:

> (H4.1): The type of subsidy (match versus rebate) has no significant effect on donor behavior when the match rate and the rebate rate are equal.

Stage 5: Noncompliance and enforcement

In the final stage, we will introduce the possibility of noncompliance. At the beginning of each round, subjects will be randomly selected into either a matching or equivalent rebate regime and will be randomly assigned an amount of income. Participants will be instructed to make two choices: how much of their incomes to contribute to the public good and how much to report to the tax authority (the experiment administrator). Contributions will be anonymous, and the tax authority will know only the sum of contributions, X, and the individual reported amounts. Before making their choices, participants will be told that the tax authority will randomly audit their reported contributions with probability equal to ρ, and that the audit will re-

veal their true contributions with certainty. This means that, whoever's case is drawn, the experiment administrator, who already knows the size of the reported contribution, will learn the value of the actual contribution.

Under the rebate regime, participants will receive a rebate at rate t, similar to a tax deduction for charitable contributions. They will be told that being found to have misstated their contribution will result in reducing the rebate to t times the actual contribution. In addition, they will face a fine equal to some fraction, $0 \leq \delta \leq 1$, of the amount of the misstatement. For cases that are not drawn, the actual contribution is not revealed to the administrator, and no penalty occurs, even if the participant misstated contributions.

Under the matching regime, individual contributions are matched at rate m. Subjects who are audited and found to have misstated their contributions will receive the same fine as above, and the public good match will be reduced to m times the actual contribution. The significant difference between the two systems is that noncompliance via overstatement of contributions yields only a private benefit (increased rebate) in the rebate system, while overstatement under the matching system results only in expansion of the public good.

Participants will perform the activity multiple times to allow them to learn that the audit rate, the penalty rate, and the lack of consequences in the absence of audit are all credible.

This structure will allow us to estimate total noncompliance in reporting of charitable contributions. Varying the audit rate and penalty rate allows estimation of the elasticity of compliance with regard to these variables, as has been done in other tax compliance experiments. However, our primary goal is examining how noncompliance might affect the donor behavior and the total size of the public good. Therefore, with the results of this stage, we will test these hypotheses:

> (H5.1): Controlling for the rebate (match) rate and income, actual donors will overstate their contributions when the rebate (match) is a function of reported, rather than actual, contributions, and audits of the reported amounts are conducted with a probability less than 1 (or with imperfect detection).
>
> (H5.2): Controlling for income, donors will make larger contributions under the matching system than under the equivalent rebate system when the rebate (match) is a function of reported, rather than actual, contributions, and audits of the reported amounts are conducted with a probability less than 1 (or with imperfect detection).

Conclusions

Subsidizing charitable contributions as an itemized deduction creates varying subsidy rates, opportunities for misreporting, and a considerable amount of burden on individual taxpayers. Subsidizing contributions via a match can disconnect the subsidy rate and the marginal tax rate and can change the opportunities and the incentive for misreporting. In addition, moving the reporting responsibility to the charitable organizations clearly reduces the burden placed on individual taxpayers. It seems intuitive that the burden reduction for individuals would more than outweigh the increase in burden placed on charitable organizations. Experimental research has shown that the matching subsidies can actually increase charitable contributions. This result is inconsistent with most simple economic models. However, a minor departure from these models can predict behavior that is consistent with the experimental research.

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